

DETAILED ACTION

Response to Amendment

1. The applicant's amendment filed 3/9/2011 has been fully considered and made of record.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 6-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, lines 8-9, the limitation of "a flange which is **sandwiched** by said small-diameter portion and said large-diameter portion" is considered new matter with no support in the specification (emphasis added). There is no disclosure in specification to define how exactly the flange is being sandwiched. It is noted that the word "sandwich" has a specific meaning to imply as a layer being surrounded between two other separate layers as supported by Applicant's specification, paragraph [0003], lines 2-4, disclosing that "The steel strip 1 moving upward in the molten zinc 3 is sandwiched by a pair of support rolls 6, 6, to keep its pass line and prevent its warping and vibration."

Art Unit: 3726

However, there is no such relationship defined between the small-diameter, large-diameter and the flange in between as they are all part of a single, monolithic part.

Claim 1, lines 9-10, the limitation of “an inner diameter and an outer diameter of said flange slowly expand together” is considered new matter with no support in the specification. There is no disclosure in the specification to define what is considered to be an inner diameter and an outer diameter of the flange. Furthermore, there is no disclosure to define what exactly is a slowly expansion of a diameter. The specification, paragraph [0047], lines 4-6, discloses that “each shaft portion 20 is an integral hollow cylinder having a small-diameter portion 20a, a slowly expanding flange 20b, and a large-diameter portion 20c” but it does not disclose the claim limitation of “inner and outer diameters of the flange expand slowly together.”

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

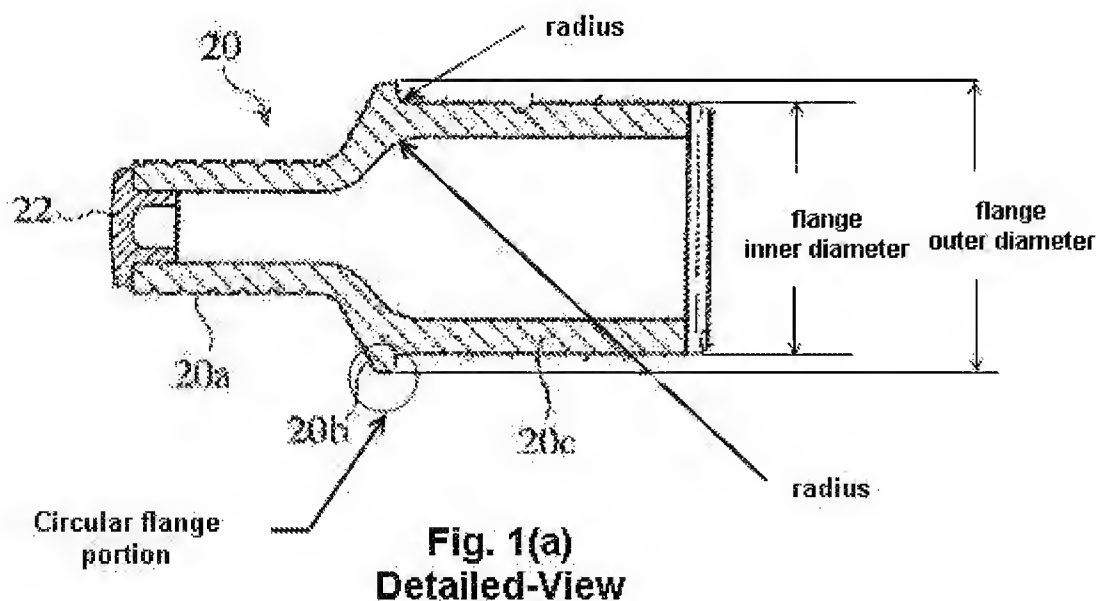
5. Claims 1 and 6-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, lines 8-9, the limitation of “a flange which is sandwiched by said small-diameter portion and said large-diameter portion” is confusing and unclear how this flange can be sandwiched by the small and large diameter portions of the shaft portion? Applicant's Figures 1(a)-(b) show that the flange is in between a large and small diameter portions. Therefore, it is not clear what the Applicant is trying to claim by using

Art Unit: 3726

the word “sandwich.” For the examination purposes, the Examiner considers that any flange feature located in between a small-diameter and a large-diameter portions would read on this claimed limitation.

Claim 1, lines 9-10, the limitation of “an inner diameter and an outer diameter of said flange slowly expand together” is confusing and unclear as to what exactly is considered an inner and an outer diameter and how would they expand slowly. Note that Fig. 1(a) of Applicant clearly labels only the circular lip on the shaft portion 20 as flange 20b. As such, the only diameters of the flange portions are shown on the “Detailed View” below. In addition, there are some internal and external radii (as labeled below) but it is not clear how these can be considered as inner and outer diameters of the flange portion since they don’t seem to be part of the flange.



Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 and 7-12, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kass et al. (US 6,589,048) in view of Imamura et al. (2002/0164475 A1), Hamayoshi (JP 2002286397 A) and Kass et al. (US 5,649,891).

As applied to claim 1, Kass et al. '048 teach a roller with hollow body with shaft portions connected to the said body capable of operating at elevated temperature (col. 1, lines 7-10, Fig. 4). Kass et al. '048 further teach (Fig. 4 below) that an inner surface of said body comprises large-diameter regions on both sides (ends) and a small-diameter region in the center (between the two ends), and each of said shaft portions is an integral hollow cylinder having a small-diameter portion, a large-diameter portion and a flange which is sandwiched by (located in between) said small-diameter portion and said large-diameter portion, said small-diameter portion and said large-diameter portion of each of said shaft portions have approximately the same thickness (at the particular region labeled in Fig. 4) and the large-diameter region of said body is connected to the large-diameter portion of said shaft portion (as shown in Fig. 4).

However, Kass et al. '048 do not explicitly teach the claimed thermal conductivity and surface roughness and that the inner diameter and outer diameter of the flange slowly expand together.

Art Unit: 3726

Imamura et al. teach that sink rolls/support rolls and shafts (used in high temperature environments) are made of ceramics (silicon nitride) for their high thermal conductivity (paragraph [0093], lines 1-19) having a surface roughness of up to 20 μm (paragraph [0044], lines 1-3).

Hamayoshi teaches that it is well-known in the art to make tubular element used in a high temperature environment from ceramics (silicon nitride) with a thermal conductivity at the ambient temperature of 70 W/(m.K) (solution, lines 1-4).

Kass et al. '891 teach a roller (10) with hollow body (10/18) with shaft portions (100) connected to the said body capable of operating at elevated temperature (col. 3, lines 6-16, Figs. 1, 3, 4A) wherein the shaft portion (100) has small diameter (148) and large diameter (128) portions slowly expanding together through the tapered transition portion (138) in between. Kass et al. '891 further teach that the transition portion (138) can have other shapes or can be omitted (i.e., 90 degree angle, col. 4, lines 17-28).

It would have been obvious to one of ordinary skill in the art at the time of invention to have made the roll (hollow body and shaft portions) of Kass et al. '048 from the ceramics (silicon nitride) material having the surface roughness of up to 20 μm , as taught by Imamura et al., as an effective means of providing a roller with a desired surface finish suitable for contact with the marking particles (Kass et al., col. 3, lines 4-9) while being highly resistant to the operating temperature.

It would have been further obvious to one of ordinary skill in the art at the time of invention to have provided the roll of Kass et al. '048 with the ceramics (silicon nitride) material having a high thermal conductivity at the ambient temperature of 70 W/(m.K),

Art Unit: 3726

as taught by Hamayoshi, considering its well-known properties of high corrosion resistance and high strength under high temperature environment.

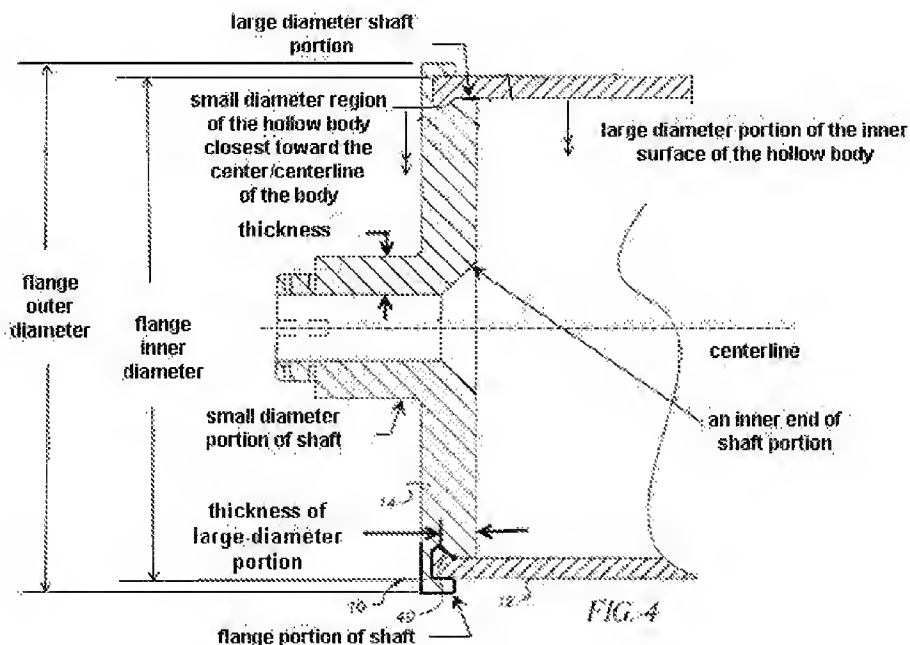
In addition, the substitution of one known shaft portion of Kass et al. '048 with another known shaft portion (having a flange portion including small diameter and large diameter portions slowly expanding together through a tapered transition portion in between), as taught by Kass et al. '891, would have been obvious to one of ordinary skill in the art at the time of invention since the substitution of shaft portion of Kass et al. '891 would have yielded predictable results, namely, effectively capping off the ends of the hollow body of Kass et al. '048 to allow the roller to rotate by a drive source within the assembly. See *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007).

The limitations of "a roll for use in a galvanizing pot" in claim 1 has not been given patentable weight because a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant application, the structure of Kass et al. as modified by Imamura et al. and Hamayoshi is capable of performing the intended use and as such, reads on the claimed limitations.

The limitation of "a roll for use in a galvanizing pot" in claim has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a

Art Unit: 3726

process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).



As applied to claim 7, Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 teach the invention cited. Kass et al. '048 further teach the roll wherein each large-

diameter region of said body is shrink-fit to the large-diameter portion of each shaft portion (Fig. 4 above, col. 4, lines 7-10).

As applied to claims 9, 10 and 12, Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 teach the invention cited. Kass et al. '048 further teach the roll wherein a ratio of the inner diameter of each small-diameter region of said body to the inner diameter of each large-diameter region of the body is 0.9 or more and less than 1.0 (as in claim 9 shown in Fig. 4 above); that the large-diameter region of said body is longer than the large-diameter portion of said shaft portion, so that there is a gap between the end of each small-diameter region of said body and the inner end of said shaft portion (as in claim 10 shown in Fig. 4 above) and that a ratio of the outer diameter of said body to the outer diameter of the small-diameter portion of each shaft portion is 2-10 (as in claim 12 shown in Fig. 4 above).

As applied to claim 8, Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 teach the invention cited. Kass et al. '048 (Fig. 4 above) further teach a shrink-fit connection between the shaft portion and the hollow body. However, the limitation of "shrink fitting ratio in a range of 0.01/1000 to 0.5/1000" is not given any patentable weight since both claims 7 and 8 are considered product-by-process claims and this product by process limitation is already taught by the structure of Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 and this extra limitation of the shrink fit ratio does not have any effect on the overall structure. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected the

Art Unit: 3726

claimed shrink fit ratio range to the roll of Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 in order to provide an effective and secured shrink fit connection of the parts without subjecting the joint to any extra stresses.

As applied to claim 11, Kass et al. '048/Imamura et al./Hamayoshi/Kass et al. '891 teach the invention cited. Kass et al. '048 (Fig. 4 above) further teach a ratio between the effective length to the outer diameter of the large-diameter portion of each shaft portion but do not explicitly teach the claimed range.

However, it is noted that the effective ratio between length to the outer diameter of the large-diameter portion of each shaft portion of the roller is a result-effective variable because it is well-known in the art of fabricating rollers, that depending on the length of the end shaft part and its ratio with the outer diameter of the shaft part, the shaft portion would have enough contact surface area for a more effective and secured engagement in the end of the hollow tube. As such, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected the claimed ratio of 0.5-2.0 for the ratio between the effective length to the outer diameter of the large-diameter portion of each shaft portion dependent on the desired contact surface area with the inner surface of the hollow tube, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

8. Applicant's arguments with respect to claims 1 and 5-12 have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's cancelling of claim 5 and deleting the limitation of "brought into contact with a steel strip" have been accepted and as such, the objection to claim 5 and the rejection of claim 1 under 35 USC 112, second paragraph stated in last office action are now withdrawn.

10. Applicant mainly argues (Remarks, page 4, paragraphs 2-4) that neither Imamura nor JP '397 discloses or suggest shaft portions of the presently claimed structure and that Kass shaft portion has no flange and JP '928 fails to disclose or suggest a flange between the large and small diameter portions whose inner and outer diameter slowly expanding together.

The Examiner respectfully disagrees with the above argument that Kass has no flange. Note (from the rejection portion of this office action) that Applicant's assertion of flange and its inner and outer diameter expanding together slowly is very ambiguous and unclear as to what exactly is being claimed. Furthermore, the Examiner has clearly identified the structure of Kass '048 to include all the claimed structural features including the flange located between the small and large diameter portions of the shaft portion.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., Kass' shaft portion has a portion of rapidly changing thickness between the large-

Art Unit: 3726

diameter portion and the small-diameter portion, Remarks, page 4, paragraph 3, lines 4-6) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). It is noted that the claim recites that the inner and outer diameter of the flange portion should slowly expand together however, Applicant argues that Kass '048 has no flange portion. Therefore, in view of the Applicant, it should be immaterial as to whether Kass '048 hollow body has a rapidly changing thickness between the large and small diameter portions or not since Applicants argues that Kass '048 has no flange portion.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 3726

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SARANG AFZALI whose telephone number is (571)272-8412. The examiner can normally be reached on 7:00-3:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bryant can be reached on (571) 272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SARANG AFZALI/

Primary Examiner, Art Unit 3726

7/15/2011